

The Beams and Applications Seminar Series

Ultrabright Multikilovolt Coherent Tunable X-Ray Source at $\sim 2.71 - 2.93 \text{ \AA}$ for Biological Microimaging

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Bldg. 401, room B2100
Friday, Apr. 2, 1:30 pm
Host: Y. Li, ASD

The recent observation of strong amplification on multikilovolt Xe(L) hollow atom transitions in the $\sim 2.8 \text{ \AA}$ spectral region can be seen as a consequence of the combination of (1) a new concept for amplification that involves the creation of a highly ordered state combining ionic, plasma, and coherent radiative components and (2) the use of two recently discovered (c. ~ 1990) forms of radially symmetric energetic matter, namely, hollow atoms and self-trapped plasma channels. This approach enables the demanding power densities necessary for x-ray amplification ($\sim 10^{19} \text{ W/cm}^3$) to be reached under conditions for which (α) the effective phase space volume of the interaction is profoundly limited and (β) the energy transfer is radiation dominated. A leading application will be the realization of a new mode of microimaging of living biological matter having a spatial resolution ~ 1000 -fold superior to conventional light microscopy.

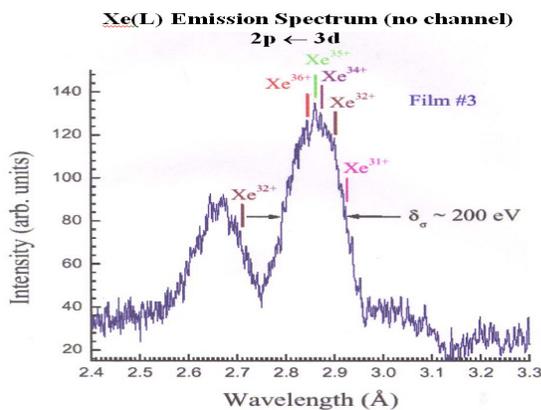


FIGURE 1. Spontaneous emission profile of Xe(L) hollow atom states.

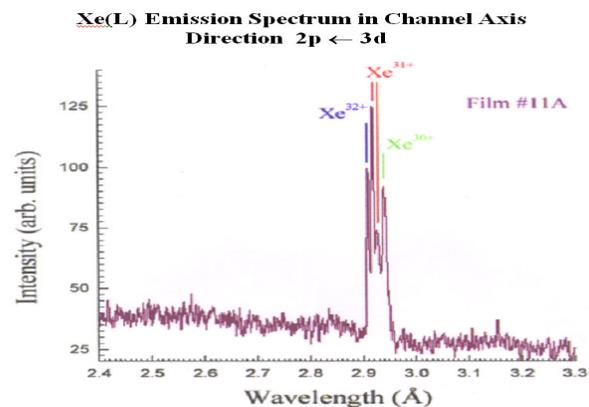


FIGURE 2. Amplified components of the Xe(L) emission on the Xe³⁰⁺, Xe³¹⁺, and Xe³²⁺ arrays observed from the plasma channel in the axial direction.

For more information visit

<http://www.aps.anl.gov/asd/physics/seminar.html>

Visitors from off-site please contact Yuelin Li

(ylli@aps.anl.gov, 630-252-7863) to arrange for a gate pass.

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